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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,199	02/20/2004	William Clay Schluchter	10040292-1	6163

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EXAMINER

LYONS, MICHAEL A

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/783,199

Applicant(s)

SCHLUCHTER ET AL

Examiner

Michael A. Lyons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 022004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

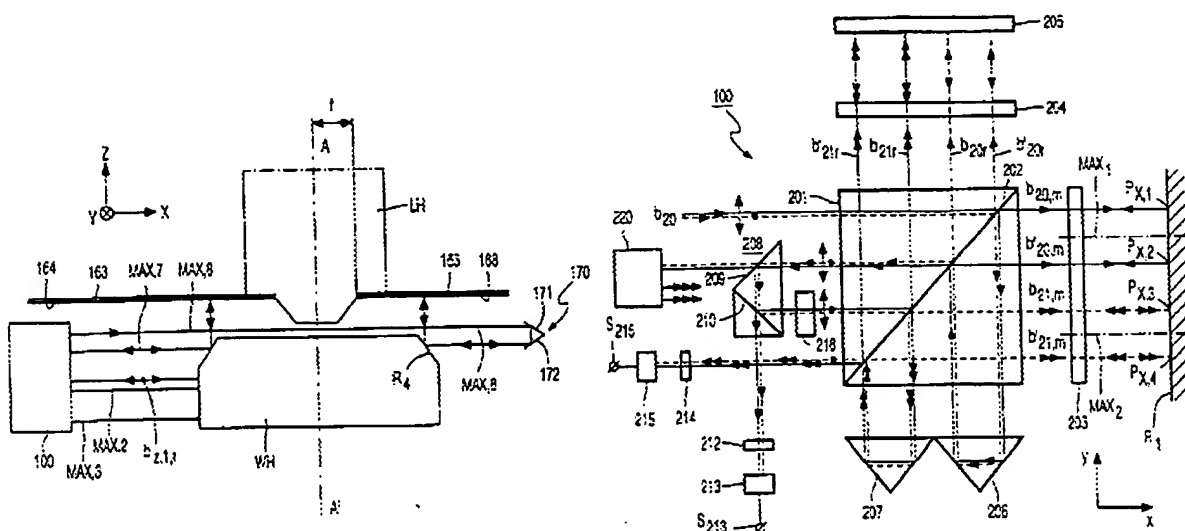
Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7-8, and 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Loopstra et al (6,020,964).



Regarding claim 1, Loopstra (Figs. 7 and 10) discloses a system for acquiring position information relevant to a specific axis comprising a movable apparatus WH having first and second reflective faces (R4 for example) on a side associated with a parallel to the X axis (see axis chart on figure), the first face being at an angle to the second face and both being non-parallel to the specific axis, an interferometer 100 positioned to direct a first beam MAX,7 for impingement of the first reflective face and a second beam MAX,8 for impingement of the

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second reflective face, the interferometer containing an beam combiner 201 and detectors 213, 215 (see Fig. 10), and beam steering mirrors 164 and 168 located with respect to the interferometer and manipulating the first and second beams to return to the interferometer and beam combiner without a beam path segment that varies in length.

As for claim 2, as the stage WH moves along any axis, the path length for the beam striking the first face will grow while the path length for the beam striking the second face will shrink, making the beam paths vary in opposition due to the motion of the stage.

As for claim 3, the interferometer generates first and second beams MAX,7 and MAX,8 as shown in Fig. 7 that impinge on the reflective faces at a perpendicular angle with respect to the displacement of the stage, the faces being oppositely angled.

As for claim 7, the apparatus stage is a wafer holding stage WH (col. 16, lines 65-66), the stage able to move perpendicularly to the lithographic (element LH) optical axis A.

As for claim 8, Fig. 10 shows a light beam b20 generated by laser 50 (Fig. 3, for example) and a beam splitter 201, the beam splitter being a polarizing beam splitter.

Regarding claim 16, Loopstra (Figs. 7 and 10) discloses a system for acquiring position information relevant to a specific axis comprising a wafer stage WH moveable in X, Y, and Z directions, the Z direction being aligned with a lithography (element LH) exposure apparatus axis A, the wafer stage having first and second reflective faces such as R4 on a side, an interferometer 100 that generates first and second beams MAX,7 and MAX,8, beam MAX,7 reflecting off a first face and MAX,8 reflecting off a second face, a plurality of optical members 164 and 168 that help define beam paths for the first and second beams, the members being located near element LH so that they do not interfere with the movement of the stage WH, where

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the beam paths increase and decrease with the motion of the stage in the Z direction, a beam combiner 201 (Fig. 10) within the interferometer 100 to combine the first and second beams once they strike the stage, and an inherent processor (not shown) that receives signals from detectors 213, 215 to acquire interferometry-based measurements regarding movements of the wafer stage in the Z direction.

As for claim 17, the light source 50 can be a Zeeman laser that emits light of two frequencies and two polarizations (Col. 13, lines 30-33).

As for claim 18, the beams each strike their respective angled face, then strike the beam returning mirror associated with the face (such as 168 with R4), then strike the respective angled face (see Figure 7).

As for claim 19, the first and second faces of the wafer stage are oppositely sloped with respect to the Z direction.

As for claim 20, as the stage WH moves along any axis, the path length for the beam striking the first face will grow while the path length for the beam striking the second face will shrink, making the beam paths vary in opposition due to the motion of the stage.

As for claim 21, the beam return mirrors are plane mirrors (see Figure 7).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4-6, and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loopstra et al (6,020,964).

As for claim 4, Loopstra discloses the claimed invention except for a symmetry position of the wafer stage such that the first and second beam paths have the same path length. It would have been obvious, however, to one having ordinary skill in the art at the time the invention was made to move the stage of Loopstra in such a way that the path lengths are equal, the motivation being that since the wafer stage movement already changes the first and second path lengths in opposition to each other (see claim 2), the wafer stage would have an inherent location with respect to the specific axis that is a symmetry position such that the optical path lengths of the first and second beams are equal.

As for claim 5, the beams each strike their respective angled face, then strike the beam returning mirror associated with the face, then strike the respective angled face (see Figure 7).

As for claim 6, the beam return mirrors are plane mirrors (see Figure 7).

As for claim 9, the beam steering members 164 and 168 are displaced from the support stage and do not interfere with the movement of the stage.

Regarding claim 10, Loopstra (Figs. 7 and 10) discloses a method of utilizing an interferometric system to acquire position information of a movable apparatus along a specific axis, this method comprising directing first and second beams MAX,7 and MAX,8 to impinge the movable apparatus WH, manipulating the first and second beams via reflections off mirrors 164, 168 and the angled faces of the wafer stage, and combining the first and second beams in interferometer 100 with beam splitter 201 as a basis for interferometrically acquiring the position information.

Loopstra fails to disclose a symmetry position of the wafer stage such that the first and second beam paths have the same path length.

. It would have been obvious, however, to one having ordinary skill in the art at the time the invention was made to move the stage of Loopstra in such a way that the path lengths are equal, the motivation being that since the wafer stage movement already changes the first and second path lengths in opposition to each other (see claim 2), the wafer stage would have an inherent location with respect to the specific axis that is a symmetry position such that the optical path lengths of the first and second beams are equal.

As for claim 11, the beam splitter 201 of interferometer 100 is a polarizing beam splitter, making the first and second beams distinguishable from one another with respect to polarization, while the movable apparatus is wafer stage WH.

As for claim 12, the beams each strike their respective angled face, then strike the beam returning mirror associated with the face (such as 168 with R4), then strike the respective angled face (see Figure 7). The mirrors are located near element LH so that they do not interfere with the movement of the stage WH.

As for claim 13, the beam return mirrors are plane mirrors (see Figure 7).

As for claim 14, while Loopsta discloses the claimed invention, in addition to the use of beam paths that vary in length with the displacement of the movable apparatus, the beam paths have portions that are parallel to the axis along which the apparatus moves. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the positioning of the beam paths so that they are not parallel to the axis, the motivation being that an adjustment of the path direction, while still maintaining the appropriate rejections off all desired faces and mirrors, will continue to allow proper functionality of the device. Additionally, it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

As for claim 15, the first and second faces of the wafer stage are oppositely sloped (see Figure 7).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Pat. 6,700,667 to Nishi.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Lyons whose telephone number is 571-272-2420. The examiner can normally be reached on Monday through Friday.

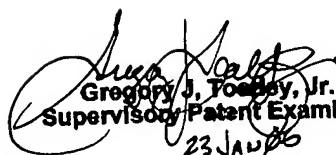
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on 571-272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAL

January 19, 2006


Gregory J. Tooley, Jr.
Supervisory Patent Examiner
23 JAN 06